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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/840,428	04/23/2001	Salvador Cerdá JR.	1543	4194
28004	7590	09/21/2004	EXAMINER	
SPRINT 6391 SPRINT PARKWAY KSOPHT0101-Z2100 OVERLAND PARK, KS 66251-2100			VARTANIAN, HARRY	
			ART UNIT	PAPER NUMBER
			2634	

DATE MAILED: 09/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	09/840,428	CERDA, SALVADOR
	<b>Examiner</b>	<b>Art Unit</b>
	Harry Vartanian	2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 23 April 2001.

2a) This action is **FINAL**.                                    2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-25 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-25 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 23 April 2001 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

- Certified copies of the priority documents have been received.
- Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
- Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 8/2001.

4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.

5) Notice of Informal Patent Application (PTO-152)

6) Other: \_\_\_\_\_.

**DETAILED ACTION*****Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-3, 5, 6, 8, 10, 11, 13, 14, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Doyle(US Pat 5,856,980). Regarding each of the above claims, Doyle meets the limitations of the claims by disclosing an encoder/decoder for a multi-level PAM(pulse amplitude modulation) scheme:

"(4) 4B-1H coding scheme, which represents four binary bits with one pulse symbol that can have any one of sixteen values. As mentioned below, for one embodiment of encoder/decoder apparatus 10, encoder 12 uses a multilevel pulse amplitude modulation scheme with more than two levels, in order to reduce the necessary transmission bandwidth. In addition, when multilevel PAM scheme with more than two levels is used, the magnitude of the frequency of the shortest cycle is one half of the magnitude of the baud rate because at least two levels (i.e., two symbols) are necessary to have a cycle. Consequently, since the sinc  $((\sin x)/x)$  response of the pulse amplitude modulated symbols has a first null at twice the frequency of the shortest cycle, there is an energy null at the frequency whose magnitude equals the magnitude of the baud rate." **(Column 3, line 56 to Column 4, Line 9)**

Moreover, in tables 1 and 2 he show an example of using PAM with various voltage levels representing a 4-level, two bit scheme. It would have been inherent to use such a scheme for a higher level 4-bits per level scheme.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 4, 9, 12, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doyle(US Pat 5,856,980) in view of Betts(US PGPUB 20030206578). Each of these claims describes a handshaking system between a transmitter and receiver to determine the maximum acceptable amplitude level. Doyle meets all the limitations of the claims except describing this handshaking method.

However, in Bett's PAM transmitting method he discloses:

"...(1) determining a maximum number of PAM levels capable of being supported by the destination transceiver and the communication channel, (2) providing information associated with the maximum number of PAM levels to a source transceiver, (3) receiving a plurality of analog symbols on the communication channel, each of the plurality of analog symbols corresponding to a signal space constellation and one of the maximum number of PAM levels, and (4) decoding the plurality of

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analog symbols into an integer number of bits comprising a plurality of symbols such that the ratio of the integer number of bits and the plurality of symbols is a non-integer corresponding to a fractional bit rate associated with the maximum number of PAM levels." **Para 0012**

"...**For example, transceiver 108 may provide a desired number of PAM levels, a desired number of symbols**, or any similar information which transceiver 104 may use to encode the desired fractional bit rate. In one of many potential embodiments, it may be sufficient to identify the symbol transmission rate, the number of bits in a frame, B, and the number of symbols in a frame, S. The number of bits and symbols are both integers. Alternatively, a single fractional value and the precision of the fraction may be provided. As a precursor, during what is known as a **handshake initialization, both transceivers identify the maximum values permissible. Then in block 300, transceiver 108 may constrain the parameters to satisfy the requirements of transceiver 104.**" **Para 0036**

"...The constellation density, or number of PAM levels, can be adjusted to match the signal to noise ratio, SNR, of any channel. **During start-up, the receiver measures the channel to determine the SNR. The receiver then computes the largest constellation consistent with the desired bit error rate at the measured SNR. At the end of initialization, the receiver signals the transmitter and identifies the constellation size that the transmitter should use.** An activation frame is sent identifying the constellation size, or **PAM level mapping**, and other parameters such as the convolutional encoder coefficients and precoder coefficients and the information contained in Tables 1 and 2." **Para 0062**

Therefor it would have been *prima facie* obvious to use handshaking in order to determine the maximum allowable voltage level in a multi-level signaling system. A motivation to combine is that it is well known in the art that handshaking is a common step used in communication systems for optimizing channel bandwidth.

3. Claims 18-20, 21, 22, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doyle(US Pat 5,856,980) in view of Betts(US PGPUB 20030206578). Regarding claims 18-19, 21, 22, and 24 Doyle meets all the limitations of the claims(please see 102(b) rejection above) except disclosing the use of software to implement his PAM.

However, in Bett's PAM transmitting method he discloses:

"The functionality in each block of FIG. 3 can be implemented in hardware, **software**, firmware, or a combination thereof. In the preferred embodiment(s), the functionality is implemented in software or firmware that is **stored in a memory and that is executed by a suitable instruction execution system**. If implemented in hardware, as in an alternative embodiment, the functionality can be implemented with any or a combination of the following technologies, which are all well known in the art: a discrete logic circuit(s) having logic gates for implementing logic functions upon data signals, an application specific integrated circuit (ASIC) having appropriate combinational logic gates, a **programmable gate array(s) (PGA), a field programmable gate array (FPGA)**, etc..." **Para 0034**

Therefor it would have been *prima facie* obvious to use software to implement the applicant's invention. A motivation to combine is disclosed by Betts in the paragraph

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above wherein he states that it's well known in the art to use hardware and/or software to implement PAM algorithms.

Regarding claims 20 and 25, Betts meets the following limitations of the claim:

receive at least one maximum amplitude from a transmitter system;  
adjust the data structure based on the at least one maximum amplitude;  
and generate and transmit an acknowledgment to the transmitter system. **Para 0012, 0036, 0062**

4. Claims 7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doyle(US Pat 5,856,980) in view of Taubenheim et al (US PAT 6,198,779). Doyle meets all the limitations of claims 7 and 15(see 102(b) rejection above) except disclosing the use of a zero crossing detector.

However, Taubenheim et al discloses:

"However, this method requires that symbol levels of a multi-level signal be known in order to examine zero crossings of the recovered waveform. The zero crossings are used to detect the symbol rate of the signal, i.e., its baud rate. Because signal levels are traditionally derived from the received signal, the baud rate detection process is data-dependent, and at times subject to error. For example, an error can occur when a long string of identical symbols is received. In this situation, the baud rate detector is unable to determine the levels of the multi-level signal, and therefore cannot determine the location of the zero crossings to calculate a baud rate. Moreover, the performance of a traditional baud rate detector is further degraded by spreading of the zero crossings due to an inherent characteristic of multi-level signals..." (**Column 1, lines 33-53**)

Therefor it would have been prima facie obvious to use a zero-crossing detector for a multi-level signal detecting system. A motivation to combine is disclosed by Taubenheim et al in the paragraph above wherein he states that a zero crossing detector is a "traditional" tool used in multi-level signaling.

5. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doyle(US Pat 5,856,980) in view of Betts(US PGPUB 20030206578) further in view of Taubenheim et al (US PAT 6,198,779). Doyle and Bett meet all the limitations of claim 23(see 103(a) rejection above) except disclosing the use of a zero crossing detector.

However, Taubenheim et al discloses:

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"However, this method requires that symbol levels of a multi-level signal be known in order to examine zero crossings of the recovered waveform. The zero crossings are used to detect the symbol rate of the signal, i.e., its baud rate..." (Column 1, lines 33-53)

Therefor it would have been prima facie obvious to use a zero-crossing detector for a multi-level signal detecting system using handshaking. A motivation to combine is disclosed by Taubenheim et al in the paragraph above wherein he states that a zero crossing detector is a "traditional" tool used in multi-level signaling.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 571.272.3048. The examiner can normally be reached on 10:00-6:30 Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571.272.3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry Vartanian  
Examiner  
Art Unit 2634

HV



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